

- Do you know what they are referring to when they refer to impellers? Is it part of a pump used to drain the drydock? The report says the pumps were not visible and were presumed to have been removed.

KB: Yes, impellers are the blades of a pump that are used to move water, so presumably the referenced impellers were part of the pumps used to drain the dry docks.

- GENERAL COMMENT #2. It is unclear why 20 bias alpha and beta locations were sufficient. The text in Section 6.2.1.1 and Table 7 indicates that 798 measurements (11 percent) exceeded the alpha release criterion of 100 disintegrations per 100 square centimeters (dpm/100 cm²) in Survey Unit 1, and alpha and beta two-minute bias static measurements were performed at the 20 most elevated scan locations. Please explain why the other 700+ locations that exceeded the alpha release criterion were not further investigated. Section 5.4.3 of the Work Plan calls for static measurements at biased locations to investigate survey results exceeding project H.L.s. Similar circumstances occurred in Survey Units 2 and 3. Section 3.4.5 (Alpha/Beta Static Measurements) states follow-up bias alpha/beta static measurements were to be performed at the highest alpha/beta scan locations in each survey unit (SU) to investigate the locations with the highest potential for elevated radioactivity and that a minimum of 20 bias alpha and beta measurement locations were identified in each SU. However, Section 6.2.1.1 does not state how it was determined collecting only a minimum of the 20 samples was sufficient to investigate the SU when there were 798 measurements above the scan investigation level (H.L.). For SU 2, 20 bias alpha and beta measurements were collected and there were 353 exceedences (5 percent), and in SU 3, there were 997 measurements (11 percent) that exceeded the alpha release criterion, but only 20 bias measurements were collected. Please revise the text to address this concern.

Commented [A1]: Does Section 6.4.5 offer an explanation where, if I understand it correctly, they say they did an outlier test on the data, identified 14 outliers, and therefore decided to follow up on the 20 highest measurements in each SU?

Commented [A2R1]: Yes, the text says that, but does not provide justification that explains why 20 locations were sufficient.

Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11:

The text states that while differences in the in situ gamma spectroscopy results were not identified and that all in situ gamma spectroscopy measurement results are comparable; however, the criteria used to determine there were no differences in the results are not discussed. For example, the text does not state if ranges of static measurements in total counts per minute (cpm), or if values for specific radionuclides between survey units were compared. Please revise this section to provide a more detailed discussion that explains how the data were evaluated and what criteria were used as the basis for the conclusion that all in situ gamma measurement results were comparable.

Commented [A3]: Does the statement that no differences were identified refer to differences between SUs? If so and SUs differ, how is it determined if the difference is significant? And what are the consequences if the difference is significant?

Commented [A4R3]: a) The statement appears to refer to differences between background and SU measurements but it is not clear this is the case. It is not clear how it would be relevant to compare SU results with each other, given that the physical configurations were different (e.g., some measurements were taken on horizontal surfaces, some were collected vertical surfaces, and some were collected within rectangular holes for impellers. b) It isn't clear what differences are significant or how the comparisons were done. That is the basis for this comment. c) If the differences are significant, then the statement that all gamma measurement results are comparable is untrue and there could be contamination.

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Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11:

The text does not state if one of the objectives was to identify elevated Cesium-137 (Cs-137) that may be present due to historical operations at the site. For example, it is unclear if one of the seven regions of interest (ROIs) was set to detect Cs-137. Please revise the text to clarify whether one objective was to identify areas with elevated Cs-137.

Commented [A5]: I'm not clear what the comment is asking for. Isn't Cs-137 an ROC for this study? Doesn't that mean that detecting any elevated Cs-137 was an objective?

Section 6.4.4, In Situ Gamma Spectroscopy Measurement Results Data Quality Review, Page 6-11: This section states, "No sensitivity calculations were performed beyond the ability to identify peaks within the regions of interest. This process was sensitive enough to accomplish the survey objectives;" however, the text does not state what criteria were used to determine that the process was sensitive enough to accomplish the survey objectives, or to

Commented [A6R5]: Cs-137 is an ROC for this study. However, it is not clear if one of the 7 regions of interest mentioned in the text of Section 6.4.4 was set to detect Cs-137. Perhaps the request should be to specify if one of the 7 ROIs was set for Cs-137. See potential edit.

what survey objectives this statement is referring. For example, if the survey objective was to identify potential discreet radiological sources such as historical deck markers, then this section should be revised to state that was the basis for the sensitivity evaluation. Please revise this section to provide the criteria used to assess whether the sensitivity of the in situ measurements was sufficient, and to provide a more detailed description that explains how the in situ measurements were determined to have met the sensitivity requirements.

Section 6.4.5, Alpha/Beta Scan Measurement Results Data Quality Review, Page 6-12:

The relevant Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) calculations should be provided in the text. The text states that the alpha scan MDC calculations and upper prediction level calculations identified upper bounds on the alpha scan data in the 200 to 250 dpm/100 cm² range. MARSSIM (EPA et al., 2000) Section 5.5.2.4 provides for increasing the number of measurements performed in a survey unit to account for MDC values that do not achieve the survey objectives. The number of measurements in each survey unit was increased by a factor of three to allow for an alpha scan MDC as high as 300 dpm/100 cm². A minimum of 54 alpha and beta static measurements were performed in each SU to account for the scan MDC not achieving the survey objective of measuring concentrations below the specified release criteria and ILs. However, this section does not specify the MARSSIM calculations used to determine that increasing the number of measurements by a factor of three would satisfy the criterion of meeting the survey objectives. Please revise this section to include the MARSSIM-based calculations.

- Figure 18, SU3 Gamma Scan Results - Berth 62 & 63 Vertical Surfaces: Figure 18 includes two summary data insets, one for concrete and one for gamma scans of metal surfaces, but the figure does not specify if the Z-score exceedances (colored dots) depicted on this figure were from the concrete or the metal matrix. It is noted that the highest result reported at 13,940 cpm, which is color coded orange to denote a Z-Score above 3, is identified as being from the scanning of the metal surfaces but it is unclear if all z-score exceedances depicted in this figure are from the gamma scanning of the metal, concrete, or both. Please revise the figure to clarify if the color coded gamma scanning results are from the concrete scans or metal scans.

- Figure 18, SU3 Gamma Scan Results - Berth 62 & 63 Vertical Surfaces: Figure 18 depicts a Z-Score exceedance on metal of 10.5, which significantly exceeds the Z-score trigger of three for additional investigation; therefore, an explanation for this large exceedance should be provided. For example, Section 6.1.1.3 (Survey Unit 3) should discuss why such a large deviation in the Z-score was obtained at this location and whether follow-up gamma static measurements and/or gross alpha/beta measurements also indicated elevated radioactivity. Please revise the Report to address the potential reasons behind the elevated gamma scan result and what alpha/beta scans and statics or a follow-up gamma static measurement indicated about the level and types of radioactivity present at this location.

- Table 12, Sample Summary Statistics and Section 6.3, Solid Sample Laboratory Analysis Results, Pages 6-7 and 6-8: There are a few-five concrete samples with low-levels of Plutonium-239 (Pu-239) reported above the Decision-Level Concentration (DLC) MDC in Table 12. (-See comment about use of the MDC.) ; however, the text in Section 6.3 does

Commented [A7]: Doesn't the work plan state the objectives of the survey?

Commented [A8R7]: Not really. Here is the full text from the Work Plan:

3.2 Project Objectives

The objectives for this action are to implement the AM (Navy, 2006) and protect public health and welfare and the environment, which are consistent with the National Oil and Hazardous Substances Pollution Contingency Plan requirements in Title 40 CFR, Part 300.415(b)(2). This action includes performing scoping surveys of the Parcel F structures and identifying radioactive contamination that exceed the release criteria presented in Table 1.

Commented [A9]: Does the work plan identify detection limits as a measure of the required sensitivity? (e.g., Table 5 in the work plan). Is the comment asking whether the targeted detection limits were achieved?

Commented [A10R9]: Yes. Table 5 in the WP lists assumed measurement sensitivity. The text in Report Section 6.4.4 states that no sensitivity calculations were performed other than to do ROIs, so it is not clear if the instrument sensitivity was sufficient. Some explanatory text and possibly a table comparing the assumed sensitivity in WP table 5 with the actual sensitivity should be provided.

Commented [A11]: What does this mean? They calculate a statistic (UPL) based on the data and do what with that statistic?

Commented [A12R11]: Based on the UPL they decided that 3 times the number of statics were required (i.e., they calculated 18, and tripled it to get 54).

Commented [A13]: I don't understand what they increased. The 54 systematic samples were already specified in the work plan. Please explain.

Commented [A14R13]: See Final Rev 2 WP section 5.7.3, pdf page 29, paragraph under the calculations – the reason was to meet RASO requirements. They calculated 18 measurements, but then the WP says, "additional static measurements are necessary to meet the RASO guidance to increase the density of static measurements by a factor of 3 when basing the alpha detection probability on the 300 dpm/100 cm² hotspot limit. Fifty-four alpha/beta static measurements will be collected per SU."

Commented [A15]: What is the value of knowing whether the exceedances are due to concrete and/or metal?

Commented [A16R15]: Elevated measurements on concrete could be NORM associated with concrete and/or due in part to natural K-40 in seawater that was absorbed by the concrete over time. Elevated measurements on metal may be more indicative of contamination.

Commented [A17]: The text says there were 22, 16, and 37 locations in the 3 SUs that exceeded the IL. What is the value of asking about only the max of those 75 exceedances?

Commented [A18R17]: This Z-score is exceptionally large, so additional information appears warranted. For example, it is possible that this location is contaminated.

not discuss whether these values should be considered definitive detections. Instead, the text only states that the values were detected below the quantitation limit goal and does not discuss the results further. In addition, Table 12 does not list the total propagated uncertainty (TPU) associated with any of the radionuclide results; therefore, the actual data packages in Appendix I must be reviewed to obtain this information. TPU information is important because a reported value above the DLC would not be considered a definitive detection if the associated TPU is larger than the reported value, or if the results would fall below the MDC if the absolute value of the uncertainty is subtracted from the result. In addition, there is no indication in Table 12 as to whether any of the data was qualified as a result of the data validation; this information must be obtained from Appendix I. In order to support the presentation of the results of the investigation and conclusions thereof, please revise Table 12 to include the associated TPUs for all results, and revise the text and Table 12 to state whether any data qualifiers were required as a result of the data validation. Finally, please revise Section 6.3 to discuss whether the values reported for Pu-239 should be considered definitive detected values, and if so, to discuss the source of the Pu-239 and whether this impacts the conclusions about the status of the submarine pens. We recommend that the discussion provide the total propagated uncertainty for the five samples and apply any data qualifiers resulting from validation of the data.

Commented [A19]: What is the value of providing TPUs for values below the MDC/DLC?

Commented [A20R19]: If the TPU exceeds the result, then the result is not likely to be meaningful and its use should be limited.

- Table 12, Sample Summary Statistics: Table 12 uses the Method Detection Limit (MDL) instead of the DLC. The Work Plan calls for the use and reporting of the DLC; however, MDL is a term associated with chemical data, not radiochemistry. Radiochemical analyses do not quantify a specific limit of detection due to the random, statistical nature of the presence of radioactivity and the detection thereof, so using MDL is not appropriate. Please revise Table 12 to replace the MDLs with DLCs.

Commented [A21]: What about summary statistics in Table 5? Are they also missing for some of the instruments?

KB: Yes, there are instruments missing from Table 5.

I see gamma static RBA results on the last page of Appendix D for the Ludlum. Scan background measurements are a separate set of measurements?

KB: Yes. There should be a separate set of scan background measurements for gamma surveys.

I see a Field Change Request form in Appendix B (pp. B-5 and B-6) that says they will use an area in the Finger Piers as a concrete background area after scabbling the top surface. It also says "Scans, statics and concrete laboratory samples will be collected before and after scabbling and the information will be provided in the report." Did they do that?

KB: No, the before data (scans and statics, concrete samples), and background scanning data is missing from the report. The statics provided in Appendix D may be the "after" statics.

Is that the area referred to in Section 4.3.1? It says "A small concrete pad adjacent to SU 3 was used as the RBA for gamma measurements. ... This small pad was non-impacted because it was separate from the submarine pens and could not have been used for ship repair or other radiological operations due to its small size."

KB: Not clear. Section 4.3.1 does not discuss whether this pad adjacent to SU 3 was scabbled or whether before and after scan and static measurements were collected. Also not clear if anything adjacent to SU 3 would have been unimpacted because of decontamination efforts after operation Crossroads. Contamination removed from the ships could have impacted nearby surfaces (i.e., due to transport of fine particles of paint or metal by wind and subsequent deposition on the surface). More information is needed about how the FCR is related to the text in Section 4.3.1.

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